REMARKS

General:

Claims 1-2 and 4-7 are pending in the application before this amendment. Claims 4-7 are withdrawn from consideration as directed to a non-elected invention.

Claim 1 is amended to incorporate the feature of previous claim 2 that the average number of intermetallic compound particles is at least 6 per 1000 μm^2. Claim 2 is canceled.

Non-elected claims 4-7 are canceled.

No new matter is added by this amendment.

Election / Restriction:

The non-elected claims are canceled without prejudice, and the restriction requirement is therefore moot.

Double patenting:

The provisional double patenting rejection is noted. Until otherwise allowable subject matter is identified in at least two of the three applications, a terminal disclaimer would be premature. In particular, it cannot be assumed that application no. 11/140,425 will proceed with the allegedly conflicting claims. Also, the present application is the earliest-filed of the three applications. Absent the future development of the peculiar circumstances discussed in MPEP § 804.II.B.1.(b), it is unlikely that any double-patenting rejection will lie against the claims of the present application.

35 U.S.C. § 103 rejections:

Previous claim 1 was rejected as obvious over commonly-assigned Japanese published patent application no. JP 2001-303158 A (Yamamoto). Claim 1 has been further limited to the feature of claim 2 against which this rejection was not raised, and the rejection is therefore moot.

Amended claim 1 (previous claim 2) was rejected as obvious over commonly-assigned JP H04-231447 A (Toe et al.) in view of Yamamoto and further in view of JP S61-124544 A (Senda et al.).

The examiner cites Toe, paragraph [0004] and Table II, as disclosing the claimed Cu-Ti composition, grain size, intermetallic precipitate size, and tensile properties, but not the kind of intermetallic precipitates and their density. The examiner argues that, because Cu and Ti are essential elements, therefore intermetallic precipitates would be formed from those essential elements.

The examiner cites the discussion of prior art in Yamamoto as showing that "Cu_3Ti phase would form during age-hardening." That is not what Yamamoto says. Yamamoto only says "it is thought that" age-hardening is started by generating a Cu_3Ti phase. Absent any showing that the specific prior art being discussed by Yamamoto corresponds to the alloy of Toe, this does not assist the examiner. However, since the cited passage from Yamamoto does not provide any useful information additional to what the examiner infers from Toe, the question is moot. In fact, Yamamoto's teaching is directed to a process in which a long, hot solid solution phase ensures the Ti is completely dissolved, and a very rapid cooling prevents the formation of any but the finest of precipitates. Yamamoto actually teaches away from any process that would allow intermetallic particles with a grain size of 0.2 μm to 3 μm, as required by claim 1.

The examiner further cites Senda as showing area % and sizes of intermetallic compounds in brass. Specifically, the examiner cites to Table 1, example O, Cu-15.0Zn-7.0Al-1.0Ni-1.0Ti, having 3% area of particles ranging from 2 to 6 μm. There is no showing that the particles in question are Cu-Ti intermetallic compounds, as required by claim 1. There is no showing that whatever proportion, if any, of the particles are Cu-Ti

correspond to the number of particles per 1000 μm^2 specified in claim 1. Particles ranging from 2 to 6 μm clearly do not comply with the requirement of claim 1 that the diameter of Cu-Ti intermetallic compounds is 3 μm or less.

Finally, the examiner asserts that "the recited properties are merely conventional properties that are inherently possessed by the conventional alloy composition." That is clearly erroneous. Yamamoto's alloys do not have the recited properties. Senda's alloys do not have the recited properties. Toe does not disclose the recited properties. The properties recited in claim 1 are not only not "inherent," they are novel over all the cited references.

Further, there is nothing that would have made it obvious to a person of ordinary skill in the art, considering the teachings of the three references as a whole, to select the specific properties recited in claim 1.

Yamamoto teaches that, in order to avoid spinodal decomposition into distinct Cu and Cu-Ti phases, the Ti should be completely dissolved in the solid solution phase, and the alloy should then be cooled very rapidly. The inevitable, and intended, consequence of that rapid cooling is that it is impossible for any but the very finest of intermetallic precipitate particles to form. (The passage cited by the examiner is a discussion of prior art, and a patent specification naturally teaches away from the prior art.) Yamamoto teaches away from the present invention, in which a significant proportion of coarse intermetallic particles (at least 6 particles per 1000 μm^2 of diameter 0.2 μm or more) is deliberately included. It is important to distinguish the fine intermetallic compounds, which improve the strength of the alloy, from the coarse (diameter 0.2 μm or more) intermetallic compounds, which do not contribute to, and may even impair, the strength of the alloy.

Toe does not assist the examiner, because Toe sets only a maximum particle size, and does not suggest that the titanium, in whatever form, affects the strength of the alloy at all. (In contrast, all the other alloying elements are stated in paragraphs [0008] and [0009] of Toe to contribute to the strength.)

Senda teaches away from the invention, because it teaches intermetallic particles larger than 10 μm. (However, it is doubtful whether the ordinary skilled person would attempt to combine the teachings of Senda with those of Yamamoto or Toe, because it is

common general knowledge that differences in alloy composition have major effect on the properties of alloys and, in particular, that brass is different from copper.)

The present invention, in contrast to the cited prior art, is based on the realization that it is possible to achieve the high strength of a Cu-Ti alloy with very fine Cu-Ti intermetallic precipitates, without the drastic process conditions of Yamamoto, by deliberately permitting a limited proportion of the Cu-Ti intermetallic compounds to form coarse particles. The result is an exceptional, and unforeseen, combination of strength and economy. There is nothing in the present invention that would have made the present invention, as now claimed, obvious to a person of ordinary skill in the art.

In addition, paragraph [0004] of Toe recites a grain size of "30 μm or less." The examiner points out that his English abstract of Toe refers to a grain size of "<20 μm," although that seems to be an error in the abstract. No example in Table II of Toe has a grain size (column D) less than 10 μm. Toe does not disclose with particularity any grain size smaller than 10 μm.

Small grain sizes can be achieved with suitable control over the conditions of production. However, the smaller the grains required, the greater the trouble required, and the effort eventually becomes impractical, and even impossible. The ordinary skilled reader, given a range explicitly bounded on only one side, and limited on the other only by reaching zero or infinity, would not understand that range as disclosing or suggesting near-zero or near-infinite values. The ordinary skilled reader would understand the disclosure as suggesting a swath on the specified side of the explicit bound, and would read the specification as a whole for guidance on how close to the explicit bound to stay. In the case of Toe, the reader would see an explicit maximum bound of 30 μm, an explanation in paragraph [0011] of why particle sizes larger than 30 μm are undesirable, and examples going down to 10 μm. The ordinary skilled reader would correctly understand this as telling him "Keep below 30 μm, but there is no reason to go appreciably below 10 μm." There is nothing in Toe that discloses or fairly suggests a grain size of 8 μm or less, as recited in claim 1.

Yamamoto does not remedy the deficiency of Toe as to the grain size. Yamamoto explicitly recites a minimum size of 5 μm. However, Yamamoto has no inventive example

with a grain size less than 10 μm, and lists several comparison examples with a grain size of less than 5 μm. As previously noted, Yamamoto states that the comparison examples with grain size less than 5 μm broke in the bending test. Yamamoto, like Toe, thus teaches the skilled reader that it is not a good idea to go appreciably below 10 μm grain size.

The examiner argues in the Response to Arguments that the word "comprising" in applicants' claim 1 allows unrecited ingredients "even in major amounts." With respect, that misses the point. The issue at this point in the reasoning is whether Senda's teaching can be combined with Toe's or Yamamoto's teaching. Toe's alloys definitely do *not* have the "unrecited ingredients in major amounts." They have specific quantities of zinc and the like that are an order of magnitude smaller than Senda's. Yamamoto's alloys contain only Cu and Ti, with no additional ingredients. The references do not combine, and the question of whether Senda's composition alone reads on the composition recited in applicants' claim is moot.

At most, therefore, the examiner has supported an argument that some unspecified quantity of intermetallic precipitates, of unknown sizes, may be present in a Cu-Ti alloy. That is essentially the examiner's basis for rejecting previous claim 1 over Yamamoto alone, and the examiner has implicitly conceded that rejection does not apply against previous claim 2, present claim 1. That rejection is not enough for a *prima facie* case of obviousness of present claim 1. The examiner's rejection does not actually show a teaching in the prior art of ranges overlapping the applicants' claimed ranges.

Even if the rejection had shown overlapping ranges, it would not be enough. As is explained in MPEP § 2144.05.II, the rationale for treating overlapping ranges as *prima facie* obvious is the normal desire of the skilled person to optimize the general conditions of the prior art. However, that requires two things. First, the skilled person must know that the variable being optimized is result-effective. Second, the skilled person must know that, as well as how, the variable can be controlled. In the present case, the examiner is arguing that the intermetallic precipitates are "inherently possessed" by the prior art alloys. A reasonable person would not expect to optimize something that is "inherent."

Thus, there is no disclosure or suggestion in the cited references of an alloy having the combination of features recited in claim 1, or the improved properties arising from those

features, and the present invention as claimed is believed to be non-obvious over the references.

Conclusion:

In view of the foregoing, reconsideration of the examiner's objections and rejections and an early notice of allowance of claim 1 are earnestly solicited.

Respectfully submitted,

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